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Title Low Velocity Impact Studies on Carbon Fibre Metal Laminates

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Abstract

Fibre Metal Laminates(FML) are a new family of materials built up using a combination of thin metal foils(0.2 to 0.5mm thick) and intermediate fibre-reinforced polymer layers. An FML based on carbon fibres/glass/ aluminum (CFML) is being thought of with the objective of an energy absorbing material which is also lower in weight. Carbon Fibre Metal Laminate (CFML) is an FML developed at NAL consisting of thin aluminum foil combined with carbon-epoxy and glass-epoxy prepreg materials. CFML is proposed as the candidate material for the leading edges of wing and empennage of an aircraft. However, these carbons based laminated composites shows localized sub surface damage under relatively low energy impact events like tool fall etc. Such localized damages known as 'Barely Visible Impact Damages (BVIDs)' are a potential source of strength reduction particularly under compressive loads. It is very important to know the impact damage resistance, shape retention and the energy absorption capability during such impact events. A test program to understand the impact behavior of carbon fibre metal laminates was conducted. The results based on the low velocity impact tests for low energy levels like 3J, 6J, 9J, 17J and 30J for CFML and aluminum 2024-T3 alloy are presented in this document. A separate study carried out to understand the impact behavior of two different configurations is also analysed in this document.